Validity and Utility of Ecological Momentary Assessment Methods to Capture Sedentary Screen Behaviors in Mothers and Children

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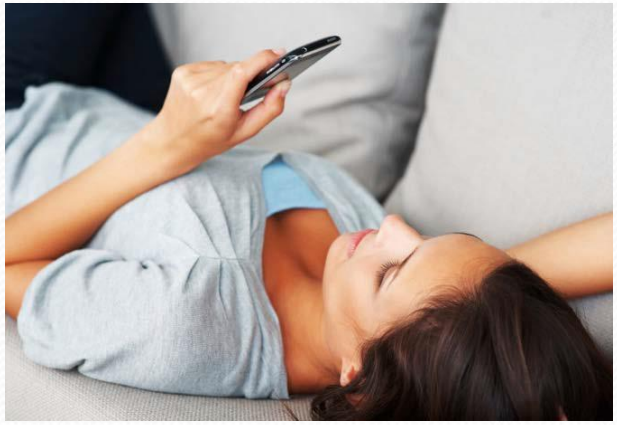
Limitations: Sedentary Behavior Measures

- Report-based Recall Methods
  - Not completed at the time or place in which the behavior occurs
  - Memory errors and biases

- Monitor-based Methods (e.g., Actigraph)
  - Device non-wear and removal (missing data)
  - Unable to capture subjective info (type of activity), context, co-occurring behaviors or perceptions (mood, motivation)

Ecological Momentary Assessment (EMA)



- **Ecological**
  - Naturalistic and real-world setttings
- **Momentary**
  - Real-time measurement
- **Assessment**
  - Multiple repeated measures

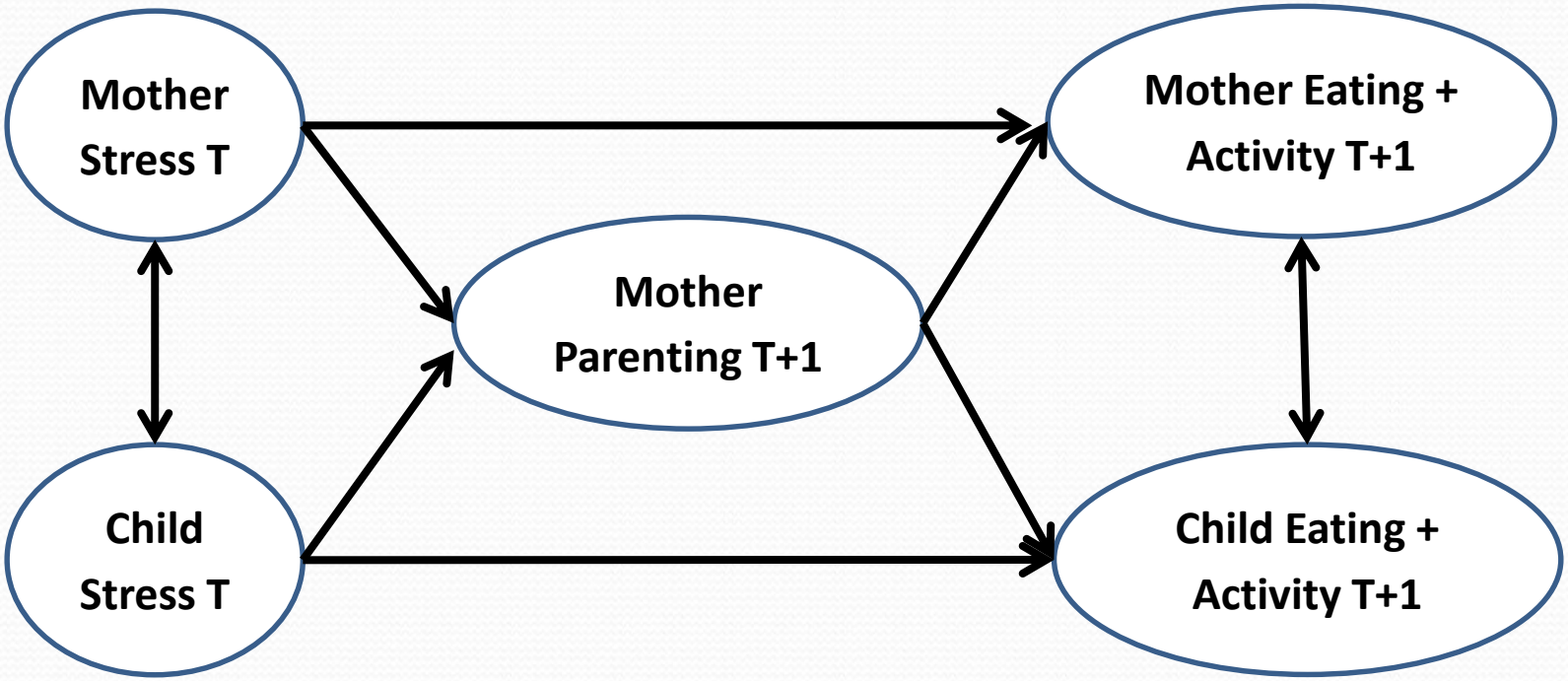
Mothers' and Their Children's Health (MATCH) Study

Participants: Mothers and their 8-12 year-old children

Design: Six waves of EMA with 6 months in between each wave (3 years total)

MATCH STUDY

Conceptual Model



Dyadic and within-subject effects

EMA App

- Java script for Java on Android OS (v 2.3.3-5.1.1)
- App downloaded to personal phone or loaned MotoG (Motorola Mobility) smartphone
- Connected to home wifi
- Wireless data transfer to cloud server

EMA Sampling Schedule

- Mother prompted during first 30 min and child during second 30 min of each window
- 9-9:30pm prompt mothers only
- Sleep and wake times customized

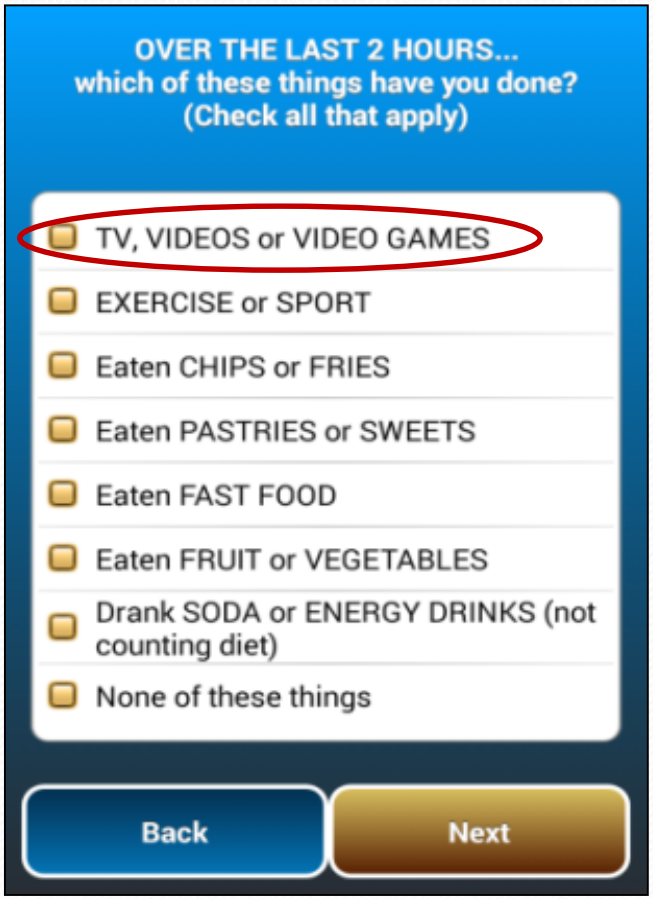
Day	7-8am	9-10am	11am-12pm	1-2pm	3-4pm	5-6pm	7-8pm	9-9:30pm
Monday					X	X	X	X
Tuesday					X	X	X	X
Wednesday					X	X	X	X
Thursday					X	X	X	X
Friday					X	X	X	X
Saturday	X	X	X	X	X	X	X	X
Sunday	X	X	X	X	X	X	X	X

EMA Question Sequences

- Item branching, skip sequences, and random item inclusion patterns
- 2-3 minutes to complete each survey
- Up to 2 re-prompts within 10-minute window and then survey becomes inaccessible

EMA Item

Activity and Eating



EMA Compliance

- 191 mothers and children initially enrolled.
- Analytic sample = 183 mothers and 182 children. A total of 8 mothers and 9 children excluded due to no EMA data available (reasons include: forgot passcode of loaned phone, phone damaged, software malfunctions)
- Mother compliance: mean = 78.1%, median = 84.4% (range 3.4%-100%)

  Child compliance: mean = 74.9%, median = 80.8% (range 10.0%-100%)

Participants

		Mothers n (%)	Children n (%)
Sex	Female	183 (100%)	95 (52.2%)
Ethnicity	Hispanic	87 (47.5%)	97 (53.3%)
Annual Income	$0-35,000	50 (27.3%)	49 (26.9%)
	$35,001-75,000	50 (27.3%)	52 (28.6%)
	$75,001-105,000	38 (20.8%)	36 (19.8%)
	> $105,001	44 (24.0%)	44 (24.2%)
Marital Status	Married	123 (67.2%)	----
Work Status	Full-time	102 (55.7%)	----
Team Sports	0 - 3 days/wk	----	138 (75.8%)
	4+ days/wk	----	36 (19.8%)
BMI	Normal	58 (31.7%)	103 (56.6%)
	Overweight	58 (31.7%)	42 (23.1%)
	Obese	60 (32.8%)	28 (15.4%)

N = 183 mothers and N =182 children

Temporal Differences in EMA-Reported Sedentary Screen Behaviors in Mothers and Children

		Mothers		Children	
		Mean % (SD)	p	Mean % (SD)	p
Overall		20.6% (18.5)	---	48.1% (28.6)	---
Day of Week	Weekdays	20.3% (20.8)	ref	43.3% (31.8)	ref
	Weekends	20.9% (21.3)	.84	53.7% (32.3)	<.0001
Time of Day	Morning	16.9% (26.9)	ref	51.4% (37.1)	ref
	Afternoon	17.9% (23.5)	.39	45.4% (31.9)	.01
	Evening	22.9% (20.8)	<.0001	49.8% (31.1)	.83

Note: Multilevel models adjust for clustering of observations within participants. Separate models run for mothers and children. Outcome is percentage of EMA prompts reporting screen behaviors over EMA prompts answered during the specified temporal period (e.g., morning, weekday).

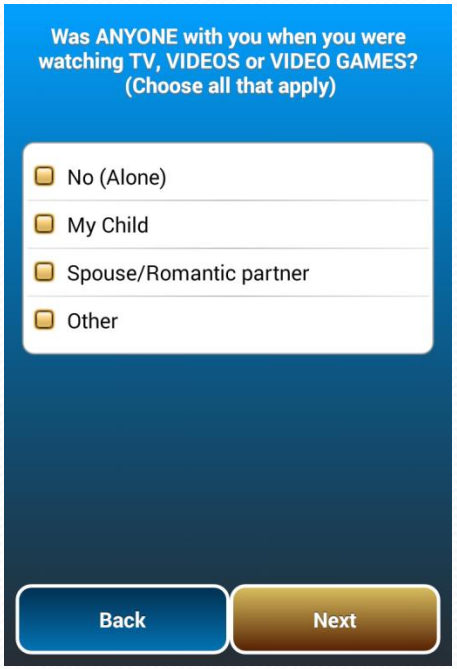
Demographic Differences in EMA-Reported Daily Sedentary Screen Behaviors in Mothers and Children

		Mothers		Children	
		Mean % (SD)	p	Mean % (SD)	p
Sex	Male			49.0% (29.2)	ref
	Female			47.3% (28.1)	.74
Ethnicity	Non-Hispanic	21.6% (20.1)	ref	52.3% (27.6)	ref
	Hispanic	19.6% (16.7)	.71	44.4% (29.0)	.03
Annual Income	$0-35,000	22.1% (19.1)	ref	51.7% (31.1)	ref
	$35,001-75,000	23.2% (17.1)	.71	45.3% (25.8)	.29
	$75,001-105,000	16.9% (17.5)	.22	44.6% (28.1)	.27
	> $105,001	19.6% (20.5)	.36	51.1% (29.1)	.98
Marital Status	Not Married	25.3% (19.5)	ref	----	----
	Married	18.4% (17.7)	.005	----	----
Work Status	Not Full-time	22.6% (19.3)	ref	----	----
	Full-time	19.4% (18.1)	.32	----	----
Team Sports	0 - 3 days/wk	----	----	50.3% (28.1)	ref
	4+ days/wk	----	----	38.3% (28.8)	.03
BMI	Normal	16.3% (17.1)	ref	48.3% (28.0)	ref
	Overweight	22.5% (19.7)	.02	45.4% (28.7)	.61
	Obese	22.5% (17.9)	.03	50.8% (31.9)	.98

Social Contexts of EMA-Reported Sedentary Screen Behaviors in Mothers

With Whom	%
Alone	27.8%
My Child	56.6%
Spouse/Romantic partners	37.3%
Other	14.6%

Note: The total is over 100% since the mother can be with multiple parties at the same time



Concurrent Eating during EMA-Reported Sedentary Screen Behaviors

Mothers			
	No Sed. Screen Behavior	Sed. Screen Behavior,	p
	Mean % (SD)	Mean % (SD)	
Chips and fries	5.5% (7.9)	7.5% (16.8)	0.004
Pastries and sweets	9.0% (11.7)	10.2% (19.4)	0.45
Fast food	4.9% (7.1)	4.8% (11.1)	0.62
Soda	5.8% (9.4)	6.7% (17.0)	0.41
Children			
	No Sed. Screen Behavior	Sed. Screen Behavior	p
	Mean % (SD)	Mean % (SD)	
Chips and fries	7.8% (16.3)	13.2% (21.6)	<0.0001
Pastries and sweets	10.3% (16.3)	15.4% (21.8)	<0.0001
Fast food	6.2% (11.7)	7.9% (16.5)	0.018
Soda	6.9% (15.0)	10.6% (21.0)	<0.0001

Note: Multilevel models adjust for clustering of observations within participants. Separate models run for mothers and children. Outcome is percentage of EMA prompts reporting eating over EMA prompts answered for that behavior.

Validation: Associations of EMA-Reported Sedentary Screen Behaviors with Actigraph-derived Sedentary Activity

	Mothers		Children	
	Minutes M (SD)	p	Minutes M (SD)	p
No Sed. Screen Behavior	78.0 (18.7)	ref	60.6 (20.8)	ref
Sed. Screen Behavior	83.3 (16.8)	<.0001	68.3 (21.1)	<.001

Note: Multilevel models adjust for clustering of observations within participants. Separate models run for mothers and children. Outcome is the number of sedentary minutes occurring in the 120 min before each EMA prompt. Non-wear removed.

Conclusions

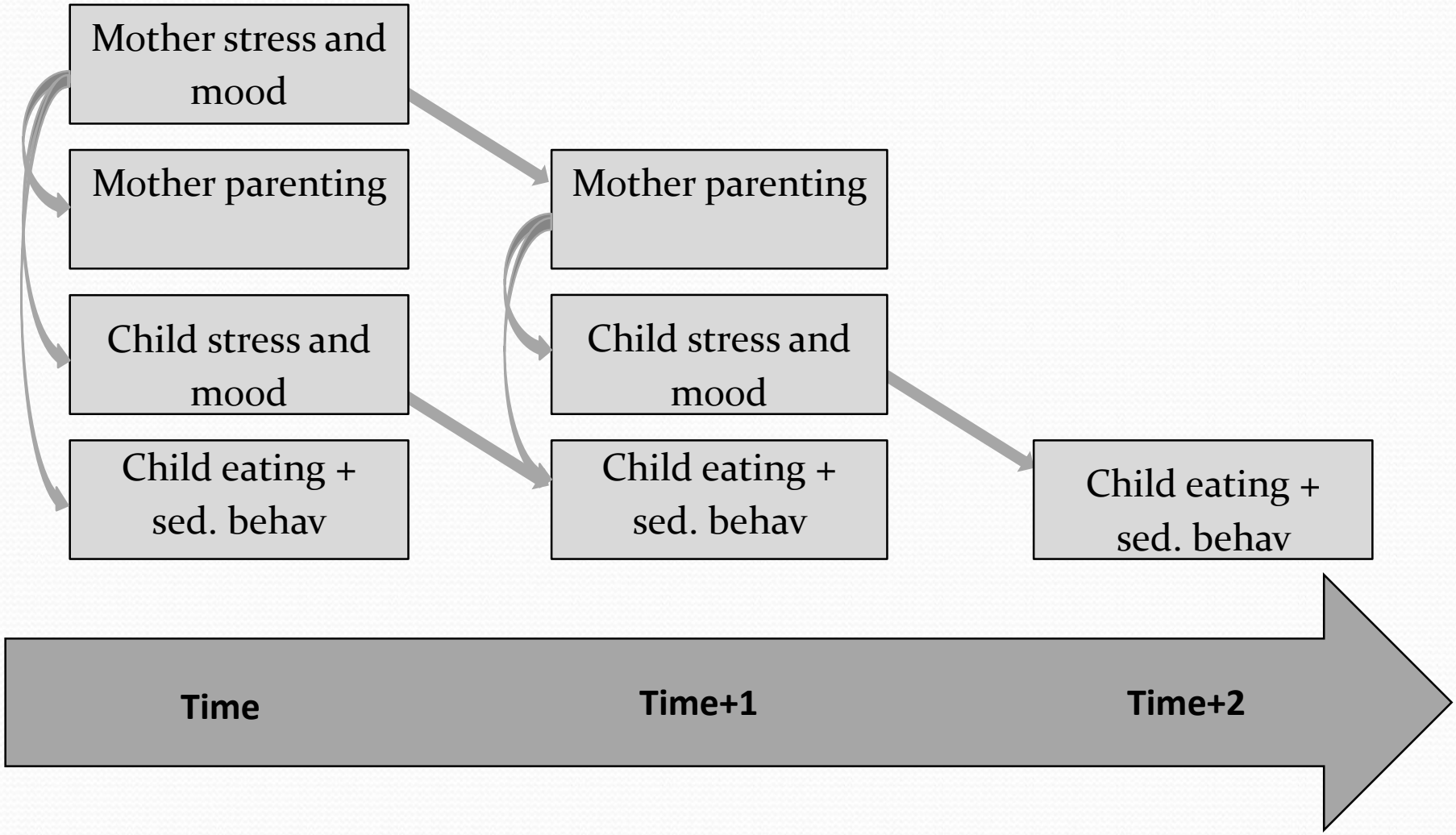
- EMA is a feasible and acceptable method of assessing sedentary screen behavior in mothers and children.
- EMA-reported sedentary screen behav. corresponds to accelerometer-derived criterion.
- Over half of mother's sedentary screen time occurred with children.

- Children more likely to consume unhealthy foods during sedentary screen behaviors.

Challenges and Limitations

- No duration info
- Missing data
- Reactance
- Participant burden
- Costs

Dyadic Data Linking



**EMA, salivary cortisol, accelerometer, and 24-hour dietary recall measures

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